

REMARKS

This is in response to the Office Action mailed on April 9, 2008. Claims 1-3 and 8-21 were pending in the application. All claims were rejected. With this amendment, claims 1, 10 and 15 are amended, and the remaining claims are unchanged in the application.

On page 4 of the Office Action, the Examiner rejected claims 1-3, 8-14 and 19-21 under 35 U.S.C. §103(a) as being unpatentable over Huang et al. WO 01/93249 (hereinafter Huang '249) in view of Huang et al. Spoken Language Processing, A Guide to Theory, Algorithm, and System Development; 2001 (herein after Huang 2001). Applicant respectfully traverses the Examiner's rejection.

Claim 1 has been amended to specifically include a composite language model that supports a vocabulary of words and includes a rules-based model portion "that has a plurality of automatically generated grammar rules, generated from an input schema to define a rules-based grammar parse tree that maps words in a natural language speech input into portions of the rules-based grammar parse tree, and a statistical model portion...[having a backoff model n-gram] separate from the plurality of statistical n-gram models corresponding to the pre-terminals..." This is simply neither taught nor suggested by the references cited by the Examiner.

Specifically, one embodiment of the present system automatically generates rules that have formerly been written by hand. For instance, the present invention can receive a schema such as the simplified schema shown in FIG. 2B and automatically generate grammar rules such as those shown in FIG. 2C. The system can also receive an annotation such as that shown in FIG. 2D and generate, from it, a set of re-write rules such as those shown in FIG. 2G. These rules can all be used to generate a grammar rules-based parse tree such as that shown in FIG. 2E. The system can use these rules (as part of the rules-based portion of the model) in order to map words in a natural language input into the parse tree shown in FIG. 2E in order to parse a natural language input.

The references neither teach nor suggest this type of automatic rule generation. In fact, in order to meet any limitations related to automatic rule generation, the Examiner appears to have cited Huang '249 page 17, lines 1-15 and page 23, lines 5-14. However, neither of these cited portions either teach or suggest any type of automatically generated rules that allow the generation of a rules-based grammar parse tree for mapping to a natural language input. The Huang '249 patent at page 17, lines 1-15 discusses a context free grammar 144 that can be used to not only predict words but non-terminals. It is specifically worth noting that the Citation issued by the Examiner only goes to line 15, but lines 15-17 specifically state "The manner in which the unified language model is created is not essential to the present invention." The Huang '249 reference then goes on to cite a related patent application that discusses one way for creating a language model. That reference was provided to the Examiner, for the Examiner's review, with the last response in the present case.

The citation to page 23, lines 5-14 simply states that in addition to the textual output from the speech recognition system 100, the speech recognition system can indicate which context-free grammars were used to provide an indication as to the slots present in the spoken phrase. This simply has nothing to do with the automatic generation of rules from an input schema to define a rules-based grammar parse tree. This notion is simply not found in the cited portions of the references. Therefore, Applicant submits that independent claim 1 is allowable.

Independent claim 10 is drawn to a method of assigning probabilities toward hypotheses during speech processing. Claim 10 has been amended to state "referring to a separate backoff model for the word hypotheses if the word hypotheses corresponds to a word unseen during training of the n-gram models; and assigning a uniform backoff probability to each word hypothesis, that corresponds to an unseen word, with the backoff model." It does not appear that any of the references, either alone or in combination, show a separate backoff model that is referred to by the plurality of n-gram models, wherein the separate backoff model need not assign separate probabilities, but instead assigns a uniform probability to all unseen words. The Huang 2001 reference cited by the Examiner does include a backoff node shown at page 618.

However, it would appear that the backoff node calculates a separate weight for each word and applies that weight to the probability calculated for each word. This is in direct contrast to the present system which specifically claims that the separate backoff model “assign[s] a uniform backoff probability to each word hypothesis...”. Applicant thus submits that claim 10 is neither taught nor suggested by the reference cited by the Examiner.

On page 2 of the Office Action, the Examiner rejected claims 15-18 under 35 U.S.C. §102(b) as being anticipated by Huang ‘249. Applicant respectfully traverses the Examiner’s rejection.

Claim 15 is directed to a composite language model for use in speech recognition systems. The composite language model includes “an automatically learned rules-based model portion having automatically learned grammar rules, automatically generated from a schema to define a grammar that is accessed to map words in an input speech signal to portions of a rules-based grammar parse tree that has slots derived from the schema; and a statistical model portion accessed to map portions of the input speech signal to pre-terminals in the rules-based grammar parse tree derived from the schema.” In rejecting this claim, and specifically on reference to “automatically learned rules”, the Examiner again cited page 17, lines 1-15 and page 23, lines 5-14 of Huang ‘249. However, these citations simply indicate that a grammar is used and that it can be used to predict various things. It does not teach or discuss how the grammar is generated, and in fact, at one portion of Huang ‘249, Huang specifically states that how the grammar is generated is not important to that disclosure. There is no teaching, suggestion, or even mention, of generating a rules-based grammar parse tree from the automatically generated rules. This is simply not found in the reference. Applicant thus submits that independent claim 15 is allowable.

In conclusion, Applicant submits that independent claims 1, 10 and 15 are allowable over the references cited by the Examiner. Applicant further submits that dependent claims 2-3, 8-9, 11-14 and 16-21, which depend from the independent claims, are allowable as well. Reconsideration and allowance of claims 1-3 and 8-21 are respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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